whether the watershed boundary has been determined accurately. This can be seen if a stream crosses a watershed boundary, resulting in a problem with the DEM. One technique to improve the accuracy of the location of the watershed boundary and generated streams is to adjust the DEM based on the location of the digitized streams. Whenever a digitized stream would fall onto a DEM raster then the elevation of the DEM raster can be adjusted by a set amount, such as subtracting three meters from the DEM raster value. This would help to ensure that the slope of the streams would be maintained when the TOPAGNPS module generates the stream network. For the Lake Tahoe Basin, the digitized perennial and intermittent streams were obtained from the USGS Lake Tahoe Data Clearinghouse WEB site.

5.2.2 AGNPS Arcview Interface Application

The AGNPS Arcview interface can simplify many of the steps used in developing the input parameters required by AnnAGNPS. The User's Guide for the AGNPS interface details the application of the program. A summary of what was done for the Lake Tahoe watersheds to develop the AnnAGNPS input dataset using the interface is provided in this chapter.

5.2.3 Watershed Segmentation

General Creek Watershed

Drainage Boundary. A determination of the drainage boundary for General Creek watershed is critical before proceeding to other issues, such as using the landuse and soils GIS layers to determine the attribute identifier from each layer. Having an accurate watershed boundary focuses the area of concern so all of the important watershed characteristics can be examined. Using the AGNPS Arcview interface, which accesses the TOPAGNPS files, and the DEM, the watershed boundary file was produced. Additional files for use with AGNPS were also produced, but the use of those will be discussed in later sections. The first step in this process is to determine the watershed outlet.

For the General Creek watershed, the outlet coincides with the mouth of General Creek as it flows into Lake Tahoe. The exact location of the outlet in terms of the position within the DEM was determined using the perennial streams and the DRG. This also allows the DEM to be reduced in size by clipping the drainage area that includes only General Creek watershed (Figure 5-1) using the AGNPS Arcview Interface. This reduces the computational time needed when using TOPAGNPS and displaying the final determinations with Arcview. The DEM was clipped based on the location of the confluence of General Creek and Lake Tahoe, and the drainage area that would flow into the farthest upstream channel locations. Elevations were then converted to meters. The watershed outlet location used by TOPAGNPS was determined by viewing the DRG and DOQQ layers with digitized streamflow locations for the entire General Creek watershed DEM, and using the "Step 2 Select watershed Outlet" menu item of the Interface with the "Interactively Select Outlet" option. Once the outlet was determined, AGNPS Arcview Interface Steps 3-6 were performed to generate the topographic parameters used by AnnAGNPS. The watershed boundary along with the generated stream network, and other associated files were also produced for use in analyzing the data for any noticeable problems.

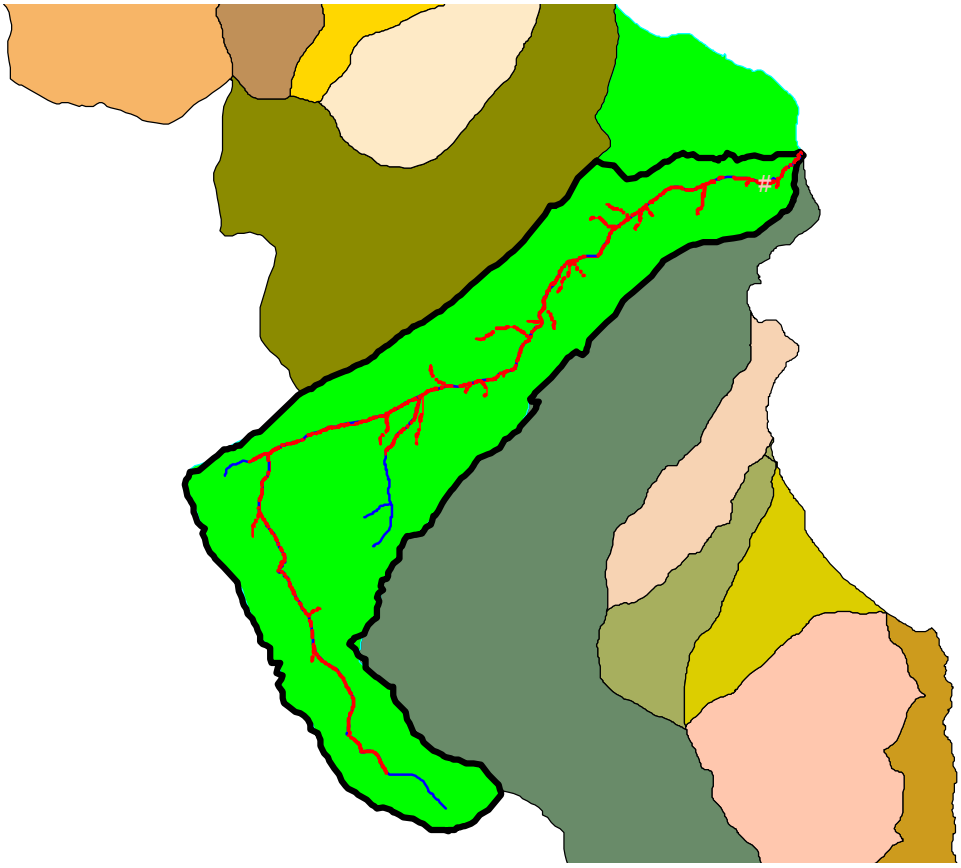

Figure 5-5. The General Creek generated watershed boundary (black line), digitized boundary (light green area), generated stream network (red line), and digitized stream network (blue line).

From previous experience, the location of the stream network generated by TOPAGNPS may not define very well the location of the major confluences as observed from the digitized streams. Thus, a modification of the clipped DEM was made based on the location of the digitized perennial and intermittent stream locations. This would provide information within the DEM concerning the location of concentrated flows and the generated stream network that would likely produce a stream network similar to the digitized stream network (Figure 5-5).

Subdrainage Areas: AnnAGNPS Cells. The determination of the subdrainage areas of the General Creek watershed into AnnAGNPS cells was performed based on the spatial variation of landuse and the location of the digitized stream network. The watershed was subdivided into a significant number of cells to reflect appropriate landuse. The process started with an assumption of the critical source area (CSA) and minimum source channel length (MSCL) required with the use of TOPAGNPS. An initial 100 hectare CSA and 300 m MSCL values were selected to produce AnnAGNPS cells that are of significant size that individual AnnAGNPS cells can be identified for further subdivision. The process of starting with the generation of AnnAGNPS cells with large drainage areas and working to subdivide only those areas of major concern to the user's satisfaction provides the simplest approach to capturing the main features of the watershed.

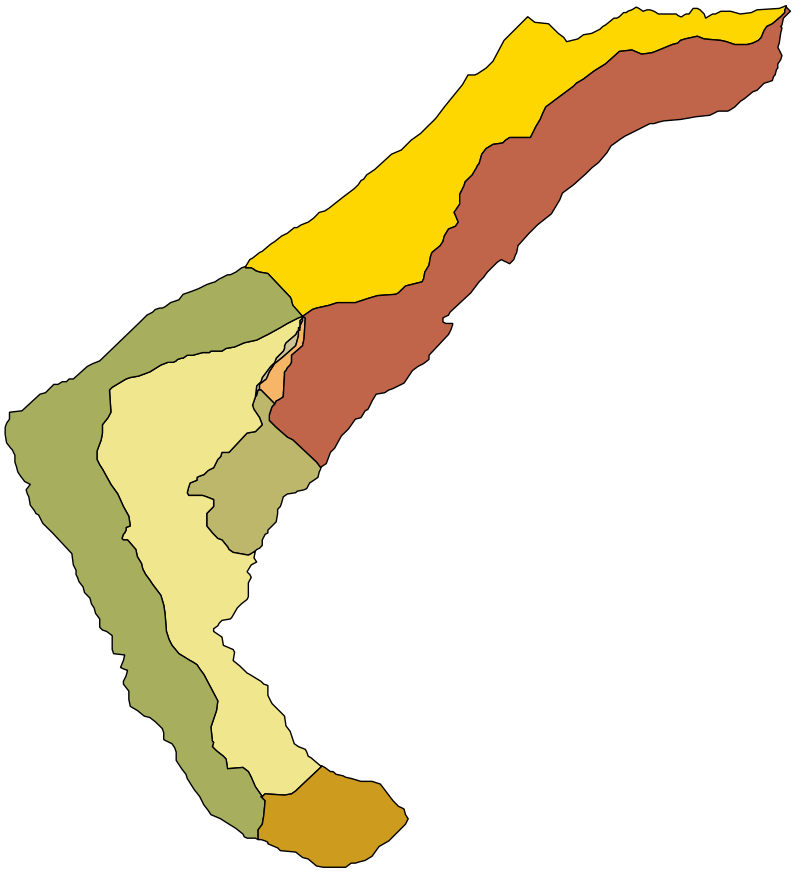

Figure 5-6. The first trial of the generation of AnnAGNPS cells for General Creek watershed.

The initial subdivision produced 8 AnnAGNPS cells distributed throughout the watershed (Figure 5-6). Since landuse areas did not appear to be adequately characterized, various AnnAGNPS cells were selected for further subdivision using one of four various TOPAGNPS regions defined within the generation of the network region generation file (ntgcod.inp) (Figure 5-7). The final subdivision of General Creek watershed with TOPAGNPS produced 126 AnnAGNPS cells based on four TOPAGNPS regions using CSA and MSCL values provided in Table 5-1, with an associated stream network of 52 reaches to produce the final subwatershed layer (Figure 5-8).

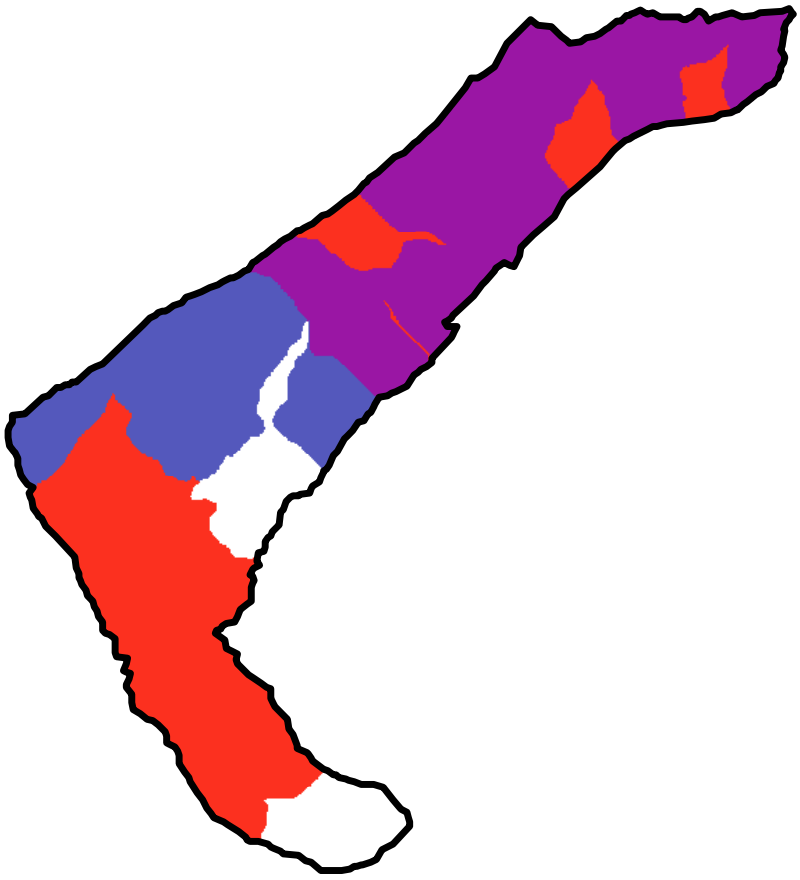

Figure 5-7. The delineation of TOPAGNPS regions for use with various CSA and MSCL values within TOPAGNPS to develop a more detailed subdivision of the watershed for use as AnnAGNPS cells. Region 1 is indicated with white, Region 2 with blue, and Region 3 with red, and Region 4 is purple.

Table 5-1. The TOPAGNPS critical source area (CSA) and minimum source channel length (MSCL) parameters used for each of the four regions defined for the final subdivision of the watershed into AnnAGNPS cells.

TOPAGNPS CSA and MSCL Region	CSA Parameter (hectares)	MSCL Parameter (meters)
1	100	300
2	50	150
3	25	75
4	10	30